(54) Title: COMPUTER SYSTEMS AND METHODS FOR INFERRING CAUSALITY FROM CELLULAR CONSTITUENT ABUNDANCE DATA
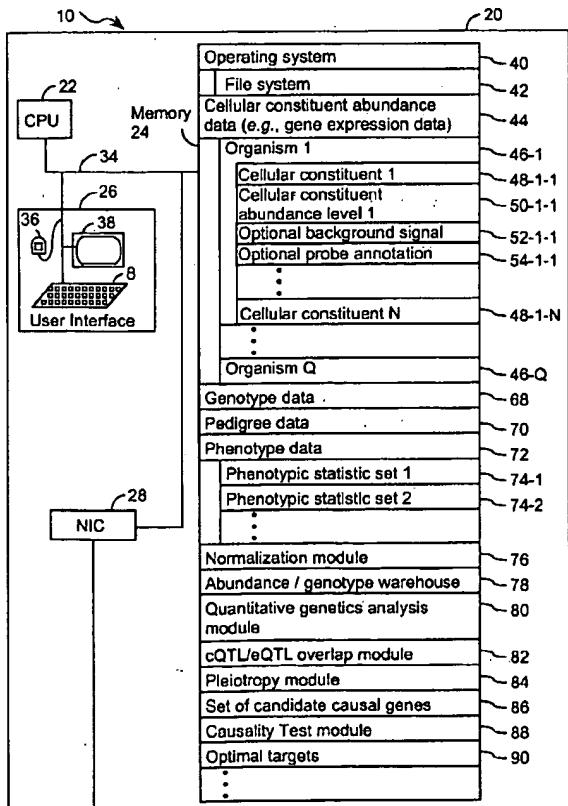
(57) Abstract: Methods, computer program products, and systems are provided for associating a cellular constituent with a trait T exhibited by a species. A cellular constituent i that has at least one abundance quantitative trait locus (eQTL) coincident with a respective clinical quantitative trait locus (cQTL) for the trait of interest T is identified. For each cQTL, a determination is made as to whether (i) the genetic variation of the eQTL and (ii) the variation of the trait of interest T across the plurality of organisms are correlated conditional on an abundance pattern of the cellular constituent i across the plurality of organisms. When the genetic variation of (i) one of the eQTL and (ii) the variation of the trait of interest T across the plurality of organisms are uncorrelated conditional on the abundance pattern of the cellular constituent i, the cellular constituent i is considered causal for, and is therefore associated with, the trait of interest T.

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